

(12) **United States Patent**
Kurimoto et al.

(10) **Patent No.:** **US 8,012,964 B2**
(45) Date of Patent: **Sep. 6, 2011**

(54) 9-SUBSTITUTED 8-OXOADENINE COMPOUND	6,951,866 B2	10/2005	Fujita et al.
(75) Inventors: Ayumu Kurimoto, Osaka (JP); Yoshiaki Isobe, Osaka (JP); Stephen Brough, Loughborough (GB); Hiroki Wada, Loughborough (GB); Roger Bonner, Loughborough (GB); Thomas McNally, Loughborough (GB)	7,157,465 B2	1/2007	Isobe et al.
	7,521,454 B2	4/2009	Isobe et al.
	7,642,350 B2 *	1/2010	Pryde
	2002/0040032 A1 *	4/2002	Glasky et al. 544/61
	2002/0068745 A1	6/2002	Levy et al.
	2002/0128264 A1	9/2002	Taylor
	2003/0105323 A1	6/2003	Fujita et al.
	2003/0144283 A1	7/2003	Coleman et al.
	2003/0191088 A1	10/2003	Hamis et al.
	2003/0212092 A1	11/2003	Heppner et al.
	2004/0010048 A1	1/2004	Crooks et al.
	2004/0132748 A1	7/2004	Isobe et al.
	2004/0204438 A1	10/2004	Crooks et al.
	2004/0229897 A1	11/2004	Crooks et al.
	2005/0054590 A1	3/2005	Averett

(Continued)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 512 days.

(21) Appl. No.: **10/593,691**(22) PCT Filed: **Mar. 24, 2005**(86) PCT No.: **PCT/JP2005/005401**

§ 371(c)(1),
 (2), (4) Date: **Dec. 4, 2006**

(87) PCT Pub. No.: **WO2005/092893**PCT Pub. Date: **Oct. 6, 2005**(65) **Prior Publication Data**

US 2007/0190071 A1 Aug. 16, 2007

(30) **Foreign Application Priority Data**

Mar. 26, 2004 (JP) 2004-093672

(51) **Int. Cl.***C07D 473/18* (2006.01)*A61K 31/522* (2006.01)*A61P 37/06* (2006.01)*A61P 37/08* (2006.01)*A61P 11/06* (2006.01)(52) U.S. Cl. **514/234.2; 544/118; 544/276; 544/277**(58) **Field of Classification Search** **544/118, 544/276, 277, 234.2; 514/234.2, 263.22, 514/263.23, 263.37, 118**

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,689,338 A	8/1987	Gerster
4,698,348 A	10/1987	Gerster
4,714,701 A	12/1987	Beauchamp
5,736,549 A	4/1998	Beasley et al.
5,994,361 A	11/1999	Penney et al.
6,028,076 A	2/2000	Hiota et al.
6,110,923 A	8/2000	Ely
6,329,381 B1	12/2001	Kurimoto et al.
6,376,501 B1	4/2002	Isobe et al.
6,458,798 B1	10/2002	Fujita et al.
6,630,478 B2 *	10/2003	Diamond et al. 514/263.3

FOREIGN PATENT DOCUMENTS

CA 1220148 A1 4/1987

(Continued)

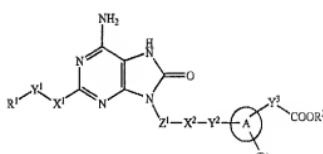
OTHER PUBLICATIONS

Dvornikova, Journal of Medicinal Chemistry (1996), 39(17), 3263-3268.*

(Continued)

Primary Examiner — Mark L Berch(74) *Attorney, Agent, or Firm* — Birch, Stewart, Kolasch & Birch, LLP(57) **ABSTRACT**

The present invention provides an 8-oxoadenine compound having immunomodulating activities such as an interferon inducing activity and useful as an antiviral agent and anti-allergic agent, which is represented by the following formula (1):



[wherein the ring A represents a 6-10 membered aromatic carbocyclic ring and the like, R represents a halogen atom, an alkyl group and the like, n represents an integer of 0-2, Z¹ represents alkylene, X² represents oxygen atom, sulfur atom, SO₂, NR², CO, CONR², NR²CO and the like, Y¹, Y² and Y³ represent independently a single bond or an alkylene group, X¹ represents oxygen atom, sulfur atom, NR² (R² is hydrogen atom or an alkyl group) or a single bond, R² represents a substituted or unsubstituted alkyl group, R¹ represents hydrogen atom, hydroxy group, an alkoxy group, an alkoxy carbonyl group or a halocarbonyl group] or its pharmaceutically acceptable salt.